

NASA TECH BRIEF



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Gelatin-Coated Electrodes Allow Prolonged Bioelectronic Measurements

The problem:

To develop electrodes that can be used for long-term monitoring of bioelectronic potentials in humans. The electrodes must not interact with perspiration, cause skin irritation, or promote the growth of bacteria. In addition, the electrodes must not increase in electrical resistance after prolonged use, develop counter emf's, or produce excessive galvanic potentials.

The solution:

Silver electrodes treated with an anodizing electrolyte containing gelatin.

How it's done:

A silver electrode is anodized in a 0.1M aqueous solution of KCl containing 0.1% "A" gelatin. The "A" gelatin is an acid-treated precursor gelatin with an isoelectric point at a pH of 7 to 8. In this neutral range, the gelatin molecule has a positive charge, and the charge is reversed by the addition of potassium chloride. The negatively charged gelatin molecule is thus electrostatically attracted to the anode to give a firmly bound silver-silver chloride-gelatin matrix. The gelatin permits the diffusion of simple ionic species but not large protein molecules which might "poison" the electrode and give irreproducible results.

The advantages of the gelatin-coated electrodes are (1) a low electric potential (209 microvolts), (2) stability and reversibility, (3) resistance to bacteria, and (4)

compatibility with skin, since the gelatin is derived from collagen, a natural protein.

Notes:

1. These electrodes should be of considerable value in electrocardiography, electroencephalography, and impedance pneumography.
2. The Ag-AgCl electrodes described in Tech Brief B64-10025 have been found to increase in electrical resistance, with consequent attenuation of the bioelectric potential being measured, after prolonged usage.
3. Related innovations are described in NASA Tech Briefs B64-10025, May 1964; B65-10015, January 1965; and B65-10320, October 1965. Inquiries may also be directed to:

Technology Utilization Officer
Manned Spacecraft Center
P.O. Box 1537
Houston, Texas, 77001
Reference: B66-10088

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C., 20546.

Source: Institute of Research and
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Manned Spacecraft Center
(MSC-153)

Category 01